Web platform and app aim to improve quality of life for people with Parkinson's disease

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The Active PD app gives people with Parkinson’s disease a way to test their motor skills and answer questions about their overall wellbeing. Credit: Fraunhofer FIT

Parkinson's disease is one of the most prevalent neurodegenerative conditions worldwide. It causes motor impairments such as tremors, slow movement, muscle stiffness, and balance problems. Memory can also worsen as the disease progresses. The individual course of the disease cannot be predicted, so experts recommend regular, close patient monitoring to allow for rapid responses to any changes in symptoms.

New technological tools aim to facilitate communication between doctors, caregivers, and patients and improve the care situation. In the ParkProReakt project, researchers from the Fraunhofer Institute for Applied Information Technology FIT are working with partners to create a digital platform and app that, used with wearables, will track the course of the disease in an effort to improve quality of life for Parkinson's patients.

There are currently about 400,000 people living with Parkinson's disease in Germany alone. Medications can help with symptoms, but there is no cure. Certain cells responsible for carrying out movements gradually die off, so people with the disease become increasingly limited in their movements and have hand and feet tremors at rest.

Getting to the doctor's office is a challenge for many patients, and there can be long distances involved, especially in rural areas. As a result, patients might only be seen every six months or even less often. New symptoms often go unrecognized by patients and their loved ones, so the information is not passed along to the treatment team.

In the ParkProReakt flagship project, researchers from the Fraunhofer Institute for Applied Information Technology FIT and partners (Philipps-Universität Marburg, Justus Liebig University Giessen, Praxis für Neurologie und Psychiatrie Hamburg Walddörfer, AWO Stadtkreis Giessen e. V. and AWO des Landesverband Hamburg e. V., Techniker Krankenkasse, Technische Hochschule Mittelhessen, University of

Cologne, Universität zu Lübeck, LiKe Research GmbH, and Portabiles Health care Technologies GmbH) plan to foster ongoing communication between doctors and patients and enable regular checkups.

The project partners are investigating whether a digital solution can help improve quality of life for patients with Parkinson's disease. The neurology team at Philipps-Universität Marburg is coordinating the project, which is slated to run until the end of 2025.

Demand-driven care model with a holistic approach

By developing a web platform and a mobile smartphone app that pairs with an Apple Watch via Bluetooth, the partners plan to establish a proactive, demand-driven, cross-sector care model that follows a holistic approach involving health care workers and specialists, who can communicate with each other on the platform. The ultimate goal is to ensure better patient care and ease some of the burden on family caregivers, as using the digital solution will help them assess changes in the course of the disease.

"The app, which is named Active PD, is used by patients themselves after an initial familiarization phase. The data collected using the app are transmitted to the web platform, which is available to doctors," explains Daniel Wolferts, a scientist at Fraunhofer FIT.

Wolferts and his team are responsible for the human-centric design of both systems, among other aspects. They are working to design the user interface to be user-friendly.

"How do we design an app for Parkinson's patients, and what kind of information do these people want to get? How do we visualize the data in both applications in a user-friendly way for all the different groups concerned, and how do we meet the requirements most effectively? How

can we make it so patients can undergo the necessary testing and examinations right on their phone without facing too big a motor challenge? Those are the kinds of questions we're working on."

Clinical study with 170 participants

The concept is being validated in clinical studies with 170 patients over a period of six months. One intervention group is to receive the digital solution, while a control group will receive conventional treatment without any added technological tools.

The patients are asked to perform standardized Parkinson's-related tests twice a week using the app and the Apple Watch, which captures their movements via sensors. The tests look mainly at their motor skills and overall condition, helping doctors and other providers to better gauge disease-related symptoms and quickly take appropriate action in response.

For example, participants are asked to do finger exercises in front of the smartphone camera, tapping their index finger and thumb together as fast as they can several times in a row. An image recognition feature detects the thumb and forefinger and measures the distance between them during the test.

Another exercise involves opening and closing a fist several times at a rapid pace. "Parkinson's patients have a hard time making these movements quickly and fluidly due to the disease," the researcher explains. In addition, sensors are used to check whether participants are able to hold their hand still for a certain period without trembling—a challenge for people with Parkinson's disease.

The tests are accompanied by questions about patient well-being so support can also be provided at the emotional level as needed. Three

color codes—green, yellow, and red—are used to alert the treating physician if a patient's condition worsens dramatically.

The app, which is currently in the prototype stage, can also be used to report incidents such as falls.

"We hope our digital solution will give providers a better window on patients' day-to-day lives and have a positive impact on their quality of life. If we're successful, we might also ultimately be able to expand the concept to cover other neurological diseases," Wolferts says.

Provided by Fraunhofer-Gesellschaft

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